HWRM-201: IRRIGATION-I (THEORY) (02 Credit hrs)

PRE-REQUISITE: F.Sc. or equivalent

LEARNING OUTCOMES:

- This course will provide an introduction to the irrigation and its objectives to the students.
- The students will learn about the different types of irrigation systems and their advantages and disadvantages
- They will have the knowledge about the concepts of crop water requirement of irrigation scheduling
- The students will learn about irrigation canals, types and design considerations
- They will become conversant with flow measurements using different hydraulic structures

CONTENTS

This course includes introduction to the principles and various practices of irrigation, basic concepts regarding crop water requirements, Canal Irrigation system as well as measurement of flow.

THEORY

Unit- 1 Introduction:

1.1. Introduction to irrigation, Definition of Irrigation
1.2. Necessity and Advantages of Irrigation
1.3. An overview on hydrology and water resources of Pakistan
1.4. Quality of Irrigation Water

Unit-II: Types of Irrigation:

2.1. Surface Irrigation methods, Free flooding, Check flooding, Furrow irrigation method, Drip irrigation method, Border irrigation, Basin Irrigation, Sprinkler irrigation.
2.2. Subsurface Irrigation methods

Unit-III: Crop Water Requirement

3.1. Crop period or Base Period
3.2. Duty and Delta of a Crop
3.3. Irrigation Efficiencies
3.4. Consumptive Use or Evapotranspiration and Estimation of Consumptive Use
3.5. Effective Rainfall
3.6. Net Irrigation Requirement
3.7. Soil-Moisture-Irrigation Relationship
3.8. Estimating Depth and Frequency of Irrigation on the Basis of Soil Moisture Regime Concept

Unit-IV: Irrigation Canals

4.1. Important Definitions; and types of Canals
4.2. Alignment of Canals, watershed canal or ridge canal, contour canal; and side-slope canals
4.3. Distribution System for Canal Irrigation, Main canal; Branch canals; Distributaries, also called major distributaries; Minors, also called minor distributaries, Watercourses.
4.4. Curves in Channels

4.5. Gross Command Area, Culturable or Cultivable Command Area, Intensity of Irrigation, Time Factor, Capacity Factor Computing the Design Capacity of an Irrigation Canal, Canal Regulation and Warabandi

Unit-V: Hydraulic Structures

5.1. Weirs, types and design considerations
5.2. Flumes, types and design considerations
5.3. Outlets

TEACHING – LEARNING STRATEGIES

- Lecture based examination
- Presentation/seminars
- Class discussion
- Quizzes

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is continuous assessment. The weightage of Assignments will be 25% before and after midterm assessment. It includes:

- classroom participation,
- attendance, assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes etc.

ASSESSMENT AND EXAMINATIONS:

Sr. No.	Elements	Weightage	Details
1.	Mid Term Assessment	35%	It takes place at the mid-point of the semester
2.	Formative Assessment	25%	It is continuous assessment. It includes: classroom participation, attendance, assignments and presentation, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

RECOMMENDED TEXT BOOKS / SUGGESTED READINGS

1. Withers, B., and Vipond, S. (1980). *Irrigation Design and Practice*. Batsford London.
2. Kay, M. (1983). *Sprinkler Irrigation*. Batsford, London, 120 pp.
3. Kay, M. (1986). *Surface Irrigation*. Cranfield Press. Bedford, 142 pp.
4. Smedema, L.K and Rycroft, D.W. (1983). *Land Drainage*. Batsford, London.
5. Kay, M. (2007). *Practical Hydraulics*. 2nd Ed., Taylor and Francis, London

HWRM-201 IRRIGATION-I (Lab) (01 Credit hr)

PRE-REQUISITE: F.Sc. or Equivalent

LEARNING OUTCOMES:

- Student will learn different methods to calculate consumptive use of water for different crops.
- This course will learn step by step procedure to calculate crop water requirements.
- Student will get practical understanding of irrigation scheduling.
- The students will learn how to measure flow using different hydraulic structures like weirs and flumes.
- Students will also perform a comparative analysis of different irrigations systems

CONTENTS

This course also provides a practical calculation regarding consumptive use of a crop, crop water requirements and irrigation scheduling. This course also includes measurements of flow using different hydraulic structures.

PRACTICAL

Unit-I Irrigation Scheduling and Crop water requirement

1.1. Solution of practical problems for estimation of irrigation efficiencies
1.2. Estimation of Consumptive Use by using different methods
1.3. Estimation of Crop water requirements for selected crops

Unit-II Flow Measurements

2.1. Practical demonstrations and calculations for flow measurement using different type of Weirs
2.2. Practical demonstrations and calculations for flow measurement using different type of Flumes

TEACHING – LEARNING STRATEGIES

- Lecture based examination
- Presentation/seminars
- Class discussion
- Quizzes

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is continuous assessment. The weightage of Assignments will be 25% before and after midterm assessment. It includes:

- classroom participation,
- attendance, assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes etc.

ASSESSMENT AND EXAMINATIONS

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